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Pacific Southwest Forest and Range
Experiment Station - Berkeley, California
Forest Service - U. S. Department of Agriculture

U. S. FOREST SERVICE RESEARCH NOTE PSW-N25 1963

CALIFORNIA CONE CROP—1963 1/

By

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ABSTRACT: A June 1963 frost in the northern part of the State killed the majority of cones on Douglas-fir, incense-cedar, and the firs, as well as many conelets of next year's pine crop. Of the major conifers, only redwood, ponderosa pine, and Jeffrey pine have medium-sized crops. Even these are scattered and hard to see, being delayed in development by unusually cold spring weather.

General

Only a few species of conifers produced more than very light amounts of seed in 1963, according to a mid-July summary of well over 1,000 field estimates. Even these crops tend to be scattered, and in the tops of the tallest trees. However, the cones are developing late, are hard to see, and the crop may be underestimated.

Fair amounts of pine cones are reported in the Pit River drainage, west of Honey Lake, in central Trinity county, and near Hume Lake. Douglas-fir is fair in eastern Tehama county, and redwood in the low elevations of Del Norte county. Collectable crops of western white pine are reported in the Warner Mountains, and of pinyon near Mt. Pinos.

Since cone crops vary considerably from place to place, it is advisable to consult field offices of the California Division of Forestry or the U.S. Forest Service to find suitable cone collection areas.

1/ In cooperation with the California Division of Forestry and Region 5, U.S. Forest Service.

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Weather

Unusually cold weather during April and May retarded forest-tree cone development as much as three weeks. Similar delays in fruit and nut ripening are noted in reports of agricultural crops. Moreover, the June 29 frost throughout the northern part of the State (24°F. at Hat Creek) killed most of the cones on Douglas-fir, incense-cedar, and the firs, as well as many conelets of next year's pine crop. Young branches of the firs, which would bear next year's cones, incurred severe damage. The late spring rains apparently interfered with pollination and cone-set in Douglas-fir over most of its range. Sample cones reveal that many contain as few as 10 seeds each.

Insects

No comprehensive survey data on insect damage are available. But near Poison Lake, Lassen county, 50 percent of the sampled ponderosa pine cones were infested to some degree, including 20 percent that were totally destroyed. In the Mad River drainage, all the sampled Douglas-fir cones contained some cone midges. Average cones had more than half their scales damaged, reducing the seed content. Some weevils are reported in ponderosa cones in Amador county.

Near Bass Lake, where Jeffrey pine cone insects were heavy last year, no signs are visible. Other areas reporting little or no insect activity are west of Honey Lake and near Covelo.

Crop Rating System

All field reports used a system devised cooperatively by the Experiment Station and Region 5 of the Forest Service in 1960. Fowells and Schubert[2/] had shown that during a 25-year period in California the bulk of each year's cones were borne on the large, dominant trees of the stand. Therefore, in the current system each locality is rated on the basis of ocular estimates of the cones on seed trees (dominant trees larger than 12 inch d.b.h. with a full crown). Each species on the area is assigned one of the following numbers:

1--None, no cones on any seed trees.

2--Very light, a few cones on less than one-fourth of the seed trees.

3--Light, a few cones on more than one-fourth of the seed trees.

4--Medium, many cones on one-fourth to one-half of the seed trees.

5--Heavy, many cones on more than half of the seed trees.

2/ Fowells, H.A., and Schubert, G. H. Seed crops of forest trees in the pine region of California. U.S. Dept. Agr. Tech. Bul. 1150, 48 pp., illus. 1956.

The reports for the major species of forest trees were distributed as follows:

Species:	Crop rating (percent of reports)					Number of reports
	1	2	3	4	5	
Ponderosa pine	17	42	25	14	2	208
Jeffrey pine	15	46	23	15	1	135
Sugar pine	31	47	12	10	0	156
Douglas-fir	49	44	3	3	1	120
Red fir	48	41	9	2	0	81
White fir	56	37	4	3	0	173
Incense-cedar	68	23	3	5	1	111

Cone Collection Areas

Table 1 summarizes reports for each species according to the forest tree seed collection zones described by Fowells (see attached map).[3/] Additionally, the zone summaries have been subdivided arbitrarily by counties to provide reference lines which already have been delineated on most maps. Moreover, increased interest in collecting seeds of a wide variety of species that grow outside the present zone boundaries has stressed the need for information from the entire State. To meet this need, we set up provisional extensions of the existing zones into adjoining counties:

Seed zone additions	Areas involved
IA	Lassen County, outside Zone I
VIA	Inyo County, outside Zone VI
XA	Lake County, outside Zone X
IXA	These counties, outside of Zone IX: San Luis Obispo, Kern, San Bernardino, Santa Barbara, Ventura, Los Angeles, Riverside, San Diego, Imperial
XIIIA	These counties, outside of Zone XIII: Mendocino, Sonoma, Napa, Marin, Contra Costa, Alameda, San Mateo, Santa Clara, San Benito, Santa Cruz, Monterey
XIV	Remainder of State (Central Valley)

Evaluation of 1962 Crop

The 1962 seed production was generally good, as predicted. The most serious losses from insect attacks occurred in Douglas-fir seed, which had about 75 percent damage. A summary of insect damage to cones can be

3/ Fowells, H. A. Forest tree seed collection zones in California. U.S. Forest Serv. Calif. Forest and Range Expt. Sta. Res. Note 51, 5 pp., illus. 1946.

found on page 9 of "Forest Pest Conditions in California--1962," the official report of the California Forest Pest Control Action Council, published by the California Division of Forestry.

How have these annual cone crop reports been performing? We have a rough check over the past few years by comparisons with actual collection. Annual collections by the California Division of Forestry of the four species, ponderosa pine, sugar pine, Douglas-fir and incense-cedar were:

Year	Sacks of cones	Crop estimate index from crop report
1959	446	(2.0) subjective evaluation
1960	2,901	3.3
1961	407	1.7
1962	3,082	2.8

The present numerical evaluation has been used only since 1960. In 1960, the California Region of the U.S. Forest Service collected and purchased 11,550 pounds of seeds; in 1962 the total was nearly 13,000. Figures are not available for 1959 or 1961, but were less than 1,000 pounds each. Thus we have evidence that the system of prediction is working. The main emphasis in the future should be on: increased numbers of reports, more details on specific localities, and earlier estimates by means of binoculars. Data on insects and weather patterns should be reinforced. Additional cooperators to furnish cone crop reports are desired.

Table 1.--Summary of cone crops by species, seed zone, and county, California, 1962

Species	Seed zone	Average rating[1]	Number of reports	County-zone ratings[2]
		MAJOR SPECIES		
Ponderosa pine (Pinus ponderosa)	I	2.3	24	Modoc - 2.5; Lasse Siskiyou - 2.3; El Dorado, Placer, Plumas, Shasta, Sierra - 2.0.
	II	2.4	26	Nevada - 4.0; Sier 3.5; Yuba - 2.5; Amador, Butte, Pl 2.3; El Dorado - Plumas - 2.0.
	III	2.5	35	Nevada - 3.5; Shas 3.0; Placer - 2.7; Amador, Siskiyou - 2.5; Plumas, Sierr 2.2.

See footnotes at end of table.

Table 1.--Summary of cone crops by species, seed zone, and county, California, 1962, continued

Species	Seed zone	Average rating[1]	Number of reports	County-zone ratings[2]
MAJOR SPECIES				
Ponderosa pine, con. (Pinus ponderosa)	IV	2.5	28	Tulare - 4.0; Tuolumne - 2.8; Calaveras, Fresno - 2.5; Kern, Madera - 2.0.
	V	2.4	32	Fresno - 3.3; Madera - 2.7; Tulare 2.5; Kern 2.0.
	VII	2.0	2	Plumas, Sierra - 2.0.
	VIII	1.5	2	--
	IX	2.0	8	Santa Barbara - 4.0; Orange, San Bernardino - 2.0.
	X	2.8	36	Glenn, Mendocino - 4.0; Shasta - 3.7; Tehama - 3.3; Trinity - 3.2; Lake, Siskiyou - 2.3.
	XI	1.9	15	Mendocino - 3.0; Humboldt, Siskiyou, Trinity - 2.0.
Jeffrey pine (Pinus jeffreyi)	I	2.5	24	Nevada, Placer - 3.0; Lassen, Modoc - 2.7; Plumas, Sierra - 2.5; Shasta - 2.3; El Dorado, Siskiyou - 2.0.
	II	2.6	9	Amador, Nevada - 3.0; El Dorado - 2.7; Shasta, Tehama - 2.0.
	III	2.7	25	Nevada - 3.3; Amador, Shasta, Sierra - 3.0; El Dorado - 2.8; Placer - 2.5; Plumas - 2.2.
	IV	2.1	7	Tuolumne - 2.3; Kern, Madera, Mariposa - 2.0.
	V	2.6	26	Madera - 3.3; Fresno - 2.8; Tuolumne - 2.6; Tulare - 2.2; Calaveras, Kern - 2.0.
	VI	2.8	4	Alpine - 3.5; Inyo, Mono - 2.0.

See footnotes at end of table.

Table 1.--Summary of cone crops by species, seed zone, and county, California, 1962, continued

Species	Seed zone	Average rating[1]	Number of reports	County-zone ratings[2]
		MAJOR SPECIES		
Jeffrey pine, con. (Pinus jeffreyi)	VII	2.4	8	Nevada, Placer - 3.0; El Dorado - 2.5; Plumas, Sierra - 2.0.
	VIII	2.0	11	Inyo - 5.0; Madera, Mono, Tulare - 2.0.
	IX	2.1	11	Riverside - 3.0; San Bernardino, San Diego - 2.0.
	X	2.1	10	Shasta - 3.0; Tehama, Trinity - 2.0.
Sugar pine (Pinus lambertiana)	I	2.1	10	Siskiyou - 2.5; Lassen, Modoc, Nevada - 2.0.
	II	2.0	23	Nevada - 4.0; Butte - 3.0; Sierra, Yuba - 2.5; Shasta - 2.0.
	III	1.9	27	Shasta - 4.3; Nevada, Siskiyou - 4.0; Sierra 2.0.
	IV	2.2	24	Fresno, Tulare - 3.0; Mariposa - 2.5; Tuolumne - 2.1; Calaveras Kern - 2.0.
	V	2.1	31	Fresno - 2.7; Madera - 2.3; Tuolumne - 2.2; Kern - 2.0.
	VII	1.8	4	El Dorado - 2.5.
	IX	1.4	7	--
	X	2.0	20	Trinity - 2.5; Shasta, Siskiyou - 2.0.
	XI	2.1	8	Siskiyou - 2.2; Del Norte - 2.0.
Douglas-fir (Pseudotsuga menziesii)	I	1.9	7	Modoc, Siskiyou - 2.0
	II	1.6	21	Butte, Shasta, Tehama 2.0.
	III	1.4	20	Siskiyou - 4.0.
	IV	1.0	2	--
	V	1.3	8	Fresno - 2.0.
	VII	1.0	3	--
	X	1.9	25	Lake - 2.3; Shasta, Siskiyou, Trinity - 2

See footnotes at end of table.

Table 1.--Summary of cone crops by species, seed zone, and county, California, 1962, continued

Species	Seed zone	Average rating[1]	Number of reports	County-zone ratings[2]
MAJOR SPECIES				
Douglas-fir, con. (*Pseudotsuga menziesii*)	XI	1.6	18	Mendocino - 2.0.
	XII	2.0	14	Del Norte, Humboldt - 2.0.
	XIII	1.5	2	Sonoma - 2.0.
Incense-cedar (*Libocedrus decurrens*)	I	1.1	7	Siskiyou - 2.0.
	II	1.3	19	Butte, Shasta, Tehama - 2.0.
	III	1.4	23	Shasta - 2.8.
	IV	1.7	15	Tulare - 4.0; Calaveras - 2.0.
	V	1.3	26	--
	VII	1.7	3	El Dorado - 2.0.
	IX	1.4	8	San Diego - 2.0.
	X	2.2	10	Tehama - 4.0; Lake, Shasta, Siskiyou, Trinity - 2.0.
Red fir (*Abies magnifica*)	I	1.2	5	--
	II	1.9	8	Amador, Nevada, Shasta, Tehama - 2.0.
	III	1.6	20	Amador, Shasta - 2.0.
	IV	2.0	3	Madera, Tulare - 2.0.
	V	1.8	16	Calaveras - 2.5; Tuolumne - 2.2; Fresno, Mariposa - 2.0.
	VII	1.9	7	El Dorado - 3.0; Nevada - 2.0.
	VIII	1.5	12	El Dorado, Inyo, Mono - 2.0.
	X	1.8	8	Shasta, Trinity - 2.0.
White fir (*Abies concolor*)	I	1.5	19	Lassen, Modoc - 2.0.
	II	1.5	19	Butte, Shasta, Tehama - 2.0.
	III	1.5	27	Placer, Shasta - 2.0.
	IV	1.5	17	Kern, Tulare - 2.0.
	V	1.4	32	Madera - 2.3; Fresno, Tulare - 2.0.
	VI	1.5	4	Inyo - 2.0.
	VII	1.5	6	El Dorado - 2.5.
	VIII	1.3	9	Inyo, Tulare - 2.0.

See footnotes at end of table.

Table 1.--Summary of cone crops by species, seed zone, and county, California, 1962, continued

Species	Seed zone	Average rating[1]	Number of reports	County-zone ratings[2]
MAJOR SPECIES				
White fir, con. (Abies concolor)	IX	1.4	7	San Bernardino - 2.0.
	X	1.6	23	Glenn - 4.0; Tehama - 2.7; Shasta, Trinity - 2.0.
	XI	1.8	10	Del Norte, Humboldt, Siskiyou, Trinity - 2.0.
Redwood (Sequoia sempervirens)	XII	3.7	11	Del Norte - 4.0; Humboldt - 2.0.
	XIII	2.0	3	Mendocino, Sonoma - 2.0.
Giant sequoia (Sequoia gigantea)	IV	3.3	3	Calaveras - 3.5; Madera - 3.0.
	V	3.2	5	Fresno - 3.5; Tulare - 3.0.
MINOR SPECIES				
Lodgepole pine (Beach pine) (Pinus contorta)	I	2.0	5	El Dorado, Lassen, Nevada, Placer, Sierra - 2.0.
	III	2.4	5	Nevada, Placer - 3.0; Amador, Butte, Plumas - 2.0.
	V	1.5	4	Fresno, Tulare - 2.0.
	VII	2.9	7	El Dorado - 4.0; Nevada, Sierra - 2.5; Placer - 2.0.
	VIII	1.7	11	Amador, El Dorado, Inyo, Tulare, Tuolumne - 2.0.
	IX	2.0	2	San Bernardino
	XII	2.0	2	Del Norte, Humboldt - 2.0.
	XIII	2.0	2	Mendocino, Sonoma - 2.0.
Western white pine (Pinus monticola)	I	3.0	1	Modoc
	II	1.7	3	Amador, Butte - 2.0.

See footnotes at end of table.

Table 1.--Summary of cone crops by species, seed zone, and county, California, 1962, continued

Species	Seed zone	Average rating[1]	Number of reports	County-zone ratings[2]
MINOR SPECIES				
Western white pine, con. (*Pinus monticola*)	III	1.9	8	Nevada, Placer - 3.0; Amador - 2.0.
	V	1.0	1	--
	VI	1.0	1	--
	VII	2.0	2	Nevada - 3.0.
	VIII	1.3	6	Tuolumne - 2.0.
Coulter pine (*Pinus coulteri*)	IX	2.8	13	Riverside - 3.7; Santa Barbara - 3.0; San Bernardino - 2.8; San Diego - 2.5; Los Angeles, Orange - 2.0.
Knobcone pine (*Pinus attenuata*)	X	2.0	1	Trinity
Whitebark pine (*Pinus albicaulis*)	VII	1.0	1	--
	VIII	1.0	3	--
Singleleaf pine (Pinyon) (*Pinus monophylla*)	VI	3.3	3	Alpine - 3.5; Mono - 3.0.
	VIII	1.0	2	--
	IX	2.0	1	San Diego
Digger pine (*Pinus sabiniana*)	X	3.0	1	Lake
	XIIIA	3.0	1	Napa
	XIV	1.3	3	Fresno - 2.0.
Bishop pine (*Pinus muricata*)	XII	3.0	2	Del Norte, Humboldt - 3.0.
	XIII	3.5	2	Mendocino
	XIIIA	2.0	1	Marin
Monterey pine (*Pinus radiata*)	XIIIA	3.0	1	Monterey
OTHERS				
Bigcone Douglas-fir (*Pseudotsuga macrocarpa*)	IX	1.8	10	Santa Barbara - 3.0; Los Angeles, Orange, Riverside, San Diego - 2.0.

See footnotes at end of table.

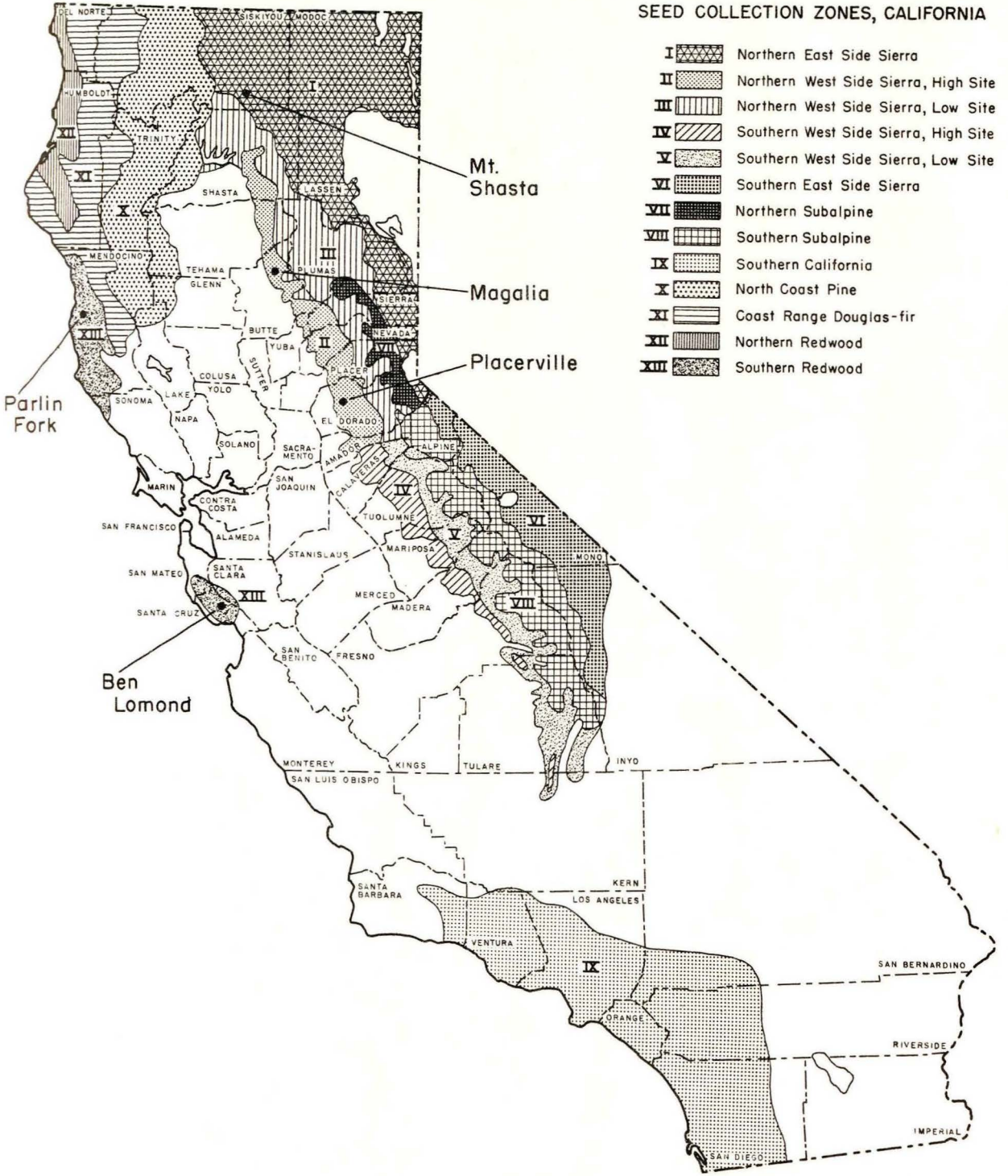
Table 1.--Summary of cone crops by species, seed zone, and county, California, 1962, continued

OTHERS

Species	Seed zone	Average rating[1]	Number of reports	County-zone ratings[2]
Bristlecone fir (Santa Lucia fir) (Abies bracteata)	XIIIA	1.0	1	--
Mountain hemlock (Tsuga mertensiana)	VII	1.0	1	--
	VIII	1.6	5	Tuolumne - 2.0.
Western juniper (Juniperus occidentalis)	I	1.0	1	--
	III	1.3	6	--
	V	1.5	2	--
	VI	1.0	2	--
	VII	1.0	1	--
	VIII	1.3	6	--
Lowland white fir (Grand fir) (Abies grandis)	XIII	2.0	2	Mendocino, Sonoma

[1] Based on the numerical scale: 1 = none; 2 = very light; 3 = light; 4 = medium; 5 = heavy.

[2] Only counties with reports higher than 2.0 are shown.


SEED COLLECTION ZONES, CALIFORNIA
I Northern East Side Sierra
II Northern West Side Sierra, High Site
III Northern West Side Sierra, Low Site
IV Southern West Side Sierra, High Site
V Southern West Side Sierra, Low Site
VI Southern East Side Sierra
VII Northern Subalpine
VIII Southern Subalpine
IX Southern California
X North Coast Pine
XI Coast Range Douglas-fir
XII Northern Redwood
XIII Southern Redwood
Mt. Shasta
Magalia
Placerville
Parlin Fork
Ben Lomond
DEL NORTE
SISKIYOU
MODOC
HUMBOLDT
TRINITY
SHASTA
LASSEN
MENDOCINO
TEHAMA
GLENN
PLUMAS
SIERRA
BUTTE
YUBA
NEVADA
COLUSA
SUTTER
PLACER
SONOMA
LAKE
YOLO
NAPA
EL DORADO
SOLANO
SACRA-MENTO
AMADOR
ALPINE
CALAVERAS
MARIN
SAN JOAQUIN
CONTRA COSTA
TUOLUMNE
SAN FRANCISCO
ALAMEDA
STANISLAUS
MARIPOSA
MONO
SAN MATEO
SANTA CLARA
MERCED
MADERA
SANTA CRUZ
SAN BENITO
FRESNO
MONTEREY
KINGS
TULARE
INYO
SAN LUIS OBISPO
KERN
SANTA BARBARA
LOS ANGELES
VENTURA
SAN BERNARDINO
ORANGE
RIVERSIDE
IMPERIAL
SAN DIEGO